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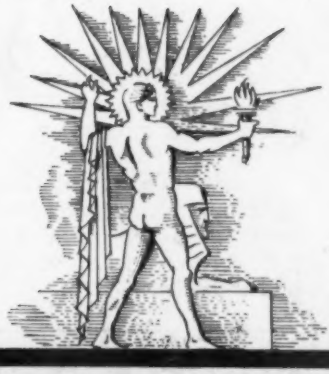
THE WEEKLY SUMMARY OF CURRENT SCIENCE •



December 27, 1941

For Better X-Rays

See Page 403

A SCIENCE SERVICE PUBLICATION

Do You Know?

Soldiers in ancient Greece used sponges to pad their *helmets.*

New Army equipment enables the Quartermaster Corps to *re-refine* used crank-case oil, removing water, gasoline and grime.

An exhibit of exotic birds at Chicago's Field Museum includes a *motmot,* Australian tawny frogmouth, and crested oropendola.

In a large-scale *diet* experiment, 1,000 volunteer aircraft workers in California are getting an extra meal a day rich in vitamins and minerals.

Chemists have evolved a speed-up continuous method of *bleaching* fabrics with hydrogen peroxide that requires only two hours and ten minutes.

Firn snow gets its name from an old German word meaning "from last year," but it may be years old on mountain tops, and it is rock-hard.

The picturesque little fish called *sea horses* really "talk"—at least they make faint snapping noises, which seem to have communication value.

The deep blue of the *Sargasso Sea* in the Atlantic Ocean is attributed to great depth of water, lack of turbidity, and scarcity of microscopic marine life.

A meteorologist says that three kinds of *ice* affect aircraft operation: glaze or clear ice; rime, which is opaque and granular; and frost, which is feathery and snowlike.

QUESTIONS DISCUSSED IN THIS ISSUE

Most articles which appear in SCIENCE NEWS LETTER *are based on communications to Science Service, or on papers before meetings. Where published sources are used they are referred to in the article.*

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PUBLIC HEALTH

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ZOOLOGY

What air raid precautions are being taken by the National Zoological Park? p. 403.

To save aluminum for defense needs, identifying *leg bands* worn by hens will be made of plastic.

Army *parachutes* are retired from active duty after seven years, but may still be used in dropping supplies.

The Department of Agriculture is now on the air with *television* to teach housewives how to buy effectively.

Young *oil birds* of northern South America and Trinidad are so fat that Indians melt out the oil for butter.

Anti-corrosive paint is now sprayed on wet or debris-covered machinery in England after a blitz, to prevent rusting.

More *fluorspar* is being required in manufacture of steel, leaving less for insecticides, pest exterminators report.

Needles of the long-leaf southern pine are often 18 inches long.

If fish had no *fins,* the weight of their backs would make them turn over.

A Seminole Indian woman may wear 25 pounds of *beads* in the chains that encircle her neck from chin to shoulders.

Light, protective *armored clothing* is one item on a recent War Department list of inventions that would be welcome.

Many cows, horses, and dogs get better breaks in the *food* they eat than families that own them, says a Cornell agriculturist.

Canadian scientists have evolved a new method of lengthening the life of *fish nets,* which cost from about $100 to $10,000.

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PHYSICS

Extremely Powerful X-Rays Made With Speeding Electrons

Whirling With Velocity Close to That of Light, Electrons Are Far More Penetrating Than Is Radium

See Front Cover

X-RAYS, more powerful than would be given by the world's total supply of radium, have been produced at the General Electric Research Laboratory by 20-million volt electrons whirling with a velocity near to that of light, which is 186,000 miles a second.

The electrons were accelerated to their enormous speeds, more than double any previously obtained, by a new instrument of research devised by Dr. Donald W. Kerst of the University of Illinois, and called by him the rheotron.

At these high speeds, the electrons are far more penetrating than those of radium, and when they strike a target generate equally powerful X-rays. The volume of output exceeds that of 1,000 grams of radium, more than the world's supply.

Although resembling the cyclotron, the rheotron is much smaller for the same voltage and its action is quite different.

The cyclotron can only accelerate heavy-weight atomic particles, at least 1,800 times heavier than the electron. This it does by giving the particle a push at each half revolution, or each half cycle of the alternating current.

In the rheotron, the entire acceleration of the electron takes place during a quarter cycle, less than a two-thousandth of a second, in which brief time the electron makes 400,000 revolutions and travels some two hundred miles.

The electrons from a hot filament are whirled in a doughnut-shaped glass tube from which the air has been exhausted. The tube fits between the poles of an electromagnet which is supplied with an alternating current. They are speeded up while the strength of the magnetic field is increasing.

The present 20,000-000-volt rheotron is patterned after a smaller table-size machine of 2,300,000 volts built by Dr. Kerst at the University of Illinois. Last year he obtained leave from the University to work with the General Electric Company on the present machine.

Work has already started on a still larger machine that will whirl electrons up to an energy of 100,000,000 volts.

There is no evident limit to the energy that can be imparted to an electron by this method, Dr. Kerst declares. It has the advantage that the electron is continuously accelerated while the magnetic field is increasing, and is kept within a comparatively small orbit which it goes around many times. Previous electron accelerators, whether linear or spiral, which boosted the speed in steps like the cyclotron, soon reached a limit because of the enormous size of the apparatus required—many times larger than a cyclotron of the same energy.

The new method is expected to be of enormous value in further atom smashing experiments. It may put at the disposal of the physicist man-made radiation almost as powerful as the cosmic rays.

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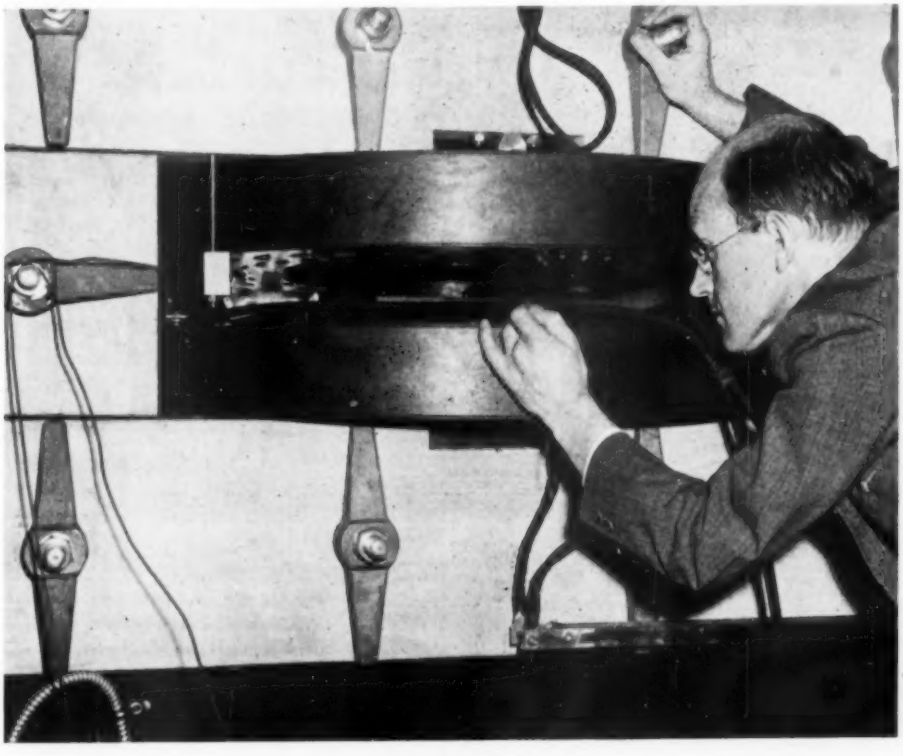

RHEOTRON

It is in this instrument that the electrons are accelerated to enormous speeds, more than double those previously attained. Adjusting the apparatus is W. F. Westendorp, of the General Electric Research Laboratory. Shown on the front cover with the doughnut-shaped vacuum tube from the rheotron is Dr. Donald W. Kerst, of the University of Illinois, who developed the rheotron.

ZOOLOGY

National Zoological Park Takes Raid Precautions

PRECAUTIONS against the off chance of an air raid have been taken at the National Zoological Park. In addition to the usual instructions on what to do to prevent fire from spreading, rifles have been placed in certain of the animal houses for use in case the more formidable specimens should be accidentally released from their cages and prove impossible to round up. Zoo attendants are cautioned not to remove these weapons, unless they should be needed for combating parachute troops.

Poisonous reptiles have not been killed, as they were in European zoological parks at the beginning of the war. The reason is, that if even cobras or rattlesnakes were to get out, the chill winter air would numb them in a short time. Only in case a poisonous reptile gets loose and remains within the reptile house, where it is warm, is it considered necessary to kill it.

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PUBLIC HEALTH

Propylene Glycol Mist Might Stop Influenza Epidemics

Idea Would Be To Spray The Chemical Into Schools, Barracks, Industrial Plants and Other Meeting Places

PREVENTION of influenza epidemics may be possible by spraying a mist of the chemical, propylene glycol, into the air of schools, barracks, industrial plants and other places where large numbers of people gather.

Such a mist protected mice from the virus of influenza A in tests reported by Dr. Werner Henle and Dr. Joseph Zellat, of the University of Pennsylvania School of Medicine and Children's Hospital, to the Society for Experimental Biology and Medicine.

No signs of influenza developed in mice exposed to the flu virus by spraying it through an atomizer into the test chamber when propylene glycol was also sprayed into the chamber. When exposed to the virus in a similar way without the propylene glycol mist, more than 50% of the mice developed influenza.

Nearly 50% of the mice exposed to the virus without the propylene glycol mist died, but only one mouse died in the group in which the mist as well as the virus was sprayed into the test chamber.

The propylene glycol mist is odorless, does not appear to stain or cause a noticeable film and the chemical has no poisonous effect on humans in the quantities used to create the mist. Its effectiveness in sterilizing air by killing bacteria had previously been announced by Dr. O. H. Robertson and associates, of the University of Chicago.

The tests by the Philadelphia scientists show that it is effective against at least one virus as well. They conclude that "propylene glycol aerosol (mist) reduces the chances of air-borne infection with the virus of influenza A and may be effective in preventing air-borne spread of the disease. The practicability of its use for this purpose has to be investigated."

Science News Letter, December 27, 1941

MEDICINE

Brain Injury Might Come From Vitamin A Lack in Infancy

IRREPARABLE paralysis and other signs of brain injury might result if babies did not get vitamin A, although this vitamin from butter and yellow vegetables like carrots is not necessary for the growth or function of the brain and spinal cord.

This seeming paradox was reported by Dr. S. B. Wolbach, of Harvard Medical School, at the meeting of the Association for Research in Nervous and Mental Disease in New York.

The damage to the nervous system with paralysis or other grave result caused by vitamin A lack is due to the fact that this vitamin is necessary for bone growth. If the vitamin is lacking during early growing periods, bone growth is markedly slowed. The brain and spinal cord are enclosed by bone. When they grow too large for the stunted skull and the rest of the bony envelopment, the consequent squeezing causes striking deformities in brain, spinal cord and nerve roots.

In experimental animals, irreparable paralysis and other signs of brain injury resulted, Dr. Wolbach and Dr. O. A. Bessey found. They are convinced that acute uncomplicated deficiency of vitamin A in the human infant would produce similar results, but have not had an opportunity to verify this.

Brain Needs One Group

VITAMINS may be divided into two groups, those needed to prevent brain and spinal cord degeneration and those not required for maintenance of nervous structure, Dr. Harold E. Himwich, of Albany Medical College, Union University, told the meeting.

The vitamins needed by the central nervous system include vitamin B_1 (thiamin, the morale vitamin), nicotinic acid amide, riboflavin, pantothenic acid, vitamin B_6 and vitamin A, Dr. Himwich said.

Vitamin B_1 plays an important part in the processes supplying energy for brain functions, helping the brain tissues to get energy from their chief foodstuff, the sugar and starch group.

Lack of this vitamin not only produces biochemical disturbances in the central nervous system, depressing brain activity by interfering with conversion of food into energy. Lack of the vitamin also produces characteristic neurological changes in the part of the body controlled by the portion of the brain affected. Rats deprived of the vitamin and unable to walk, for example, were found to have a depression of brain metabolism (energy interchange) in the part of the brain containing the nerve centers that govern movement.

Treatment of diseases will improve, Dr. Himwich pointed out, when scientists gain more such knowledge about the specific effects produced on body tissues by lack of the other vitamins.

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GENERAL SCIENCE

National Lectureships Announced by Sigma Xi

NATIONAL lectureships on scientific subjects for 1942 were announced today by the Society of Sigma Xi, national honorary fraternity for promotion of research.

Lecturers and their topics will be Dr. H. A. Bethe, department of physics, Cornell University, "Energy Production in Stars"; Dr. P. W. Bridgman, department of physics, Harvard University, "Some Recent Work in the Field of High Pressures"; Dr. H. M. Evans, department of biology, University of California, "Recent Results from Studies on the Anterior Pituitary"; Dr. John G. Kirkwood, department of chemistry, Cornell University, "The Structure of Liquids"; Dr. Lionel S. Marks, department of engineering, Harvard University, "Modern Power Generation."

Lectures will be delivered by the scientists at dates and places to be announced later. The lectures are delivered with a view to bringing leading personalities and information to various Sigma Xi chapters located in the leading universities.

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PHOTOGRAPHY

You Can Make Color Pictures With Your Roll-Film Camera

New Kokacolor Film, When Processed by Manufacturer, Gives Color Negatives From Which Prints Are Made

BEAUTIFUL natural-color photographs which can be held in the hands or placed in an album are now within the reach of the amateur snapshooter equipped with any kind of roll-film camera.

This was revealed with the announcement at the Franklin Institute by Dr. C. E. K. Mees, Eastman Kodak research director, of a new Kodacolor roll-film produced by the Eastman Kodak Company.

Home picture takers are already familiar with color pictures. But for the most part they have had to be content with color movies or transparencies which can can be shown only when projected onto a screen. Color prints could be made from these only at considerable expense and some uncertainty of the outcome. The film would fit only some cameras, usually expensive ones.

Now even the small boy or girl with a box camera can snap pictures with the new Kodacolor film, which will be available in six standard sizes.

The film must be returned to the manufacturer for processing. When it comes back to the photographer, he will have a set of color negatives—not color transparencies as in the Kodachrome now available for 35 mm. cameras. Light areas of the subject will appear dark in these negatives, and dark areas, light. The colors also will be in reverse—that is, they will be complementary to those in the actual subject. A red sweater, for example, would be a blue-green in the negative.

With these color negatives, the photographer receives full color prints on paper. The total cost will average about seventy cents for each picture.

The new Kodacolor film, like its predecessor the Kodachrome, is a sort of photographic layer-cake of color-sensitive emulsion layers. In the Kodacolor process, however, the "couplers" in which the color image is formed are not dissolved in the emulsion layers themselves, but in particles of organic materials of microscopic size which protect them from the gelatin and, at the same time, protect the silver bromide from any interaction with the couplers. When the film is placed in the developer, the oxidized developer penetrates the particles and there reacts with the coupler to form the dye.

There are three of the emulsion layers and also a yellow filter layer on the film. The developer in which it is processed acts simultaneously on all three couplers, producing a dye image in each layer.

When the finished negative is printed on a paper coated with a similar set of emulsions, the resulting color print has the colors of the original subject.

The new Kodacolor film is entirely different from the Kodacolor process used some years ago by Kodak and now obsolete.

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● RADIO

Saturday, January 3, 1:30 p.m., EST

On "Adventures in Science," over Columbia Broadcasting System, Watson Davis, director of Science Service, will give the highlights of the scientific meetings held during the Christmas holidays.

Listen in each Saturday.

Monday, December 22, 9:30 p.m., EST

Science Clubs of America programs over WRUL, Boston, on 6.04 and 11.73 megacycles.

One in a series of regular periods over this short wave station to serve science clubs, particularly in high schools, throughout the Americas. Have your science group listen in at this time.

POPULATION

Birth Rate Is Up, Death Rate Unchanged

AMERICA's birth rate is on the increase, the current vital statistics bulletin of the Commerce Department reveals.

Provisional figures for the first nine months of 1941 for 43 reporting states and the District of Columbia show a crude birth rate increase over the same period last year from 17.9 to 18.9 per 1,000 population.

The crude death rate for October, 1941, for the same states was constant at 9.8 per 1,000 population as compared with October, 1940.

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POWER TO BE

This 130,400-pound cast iron turbine base is photographed on its way to the Philadelphia Electric Company to step up power for defense industries and other consumers in that area. It was moulded at the Westinghouse Trafford foundry.

ASTRONOMY

Five Eclipses In 1942

Two of Moon, Both Total, Will Be Visible in U. S.; Four Bright Planets Still Seen Early in January

By JAMES STOKLEY

UNFORTUNATELY, no one can tell what the year of 1942 is going to have in store for the world, and for us in particular. Despite claims of the astrologers and charlatans, there is no way of telling this from the stars. But the stars do tell us what is happening in the heavens. We know the movements of the heavenly bodies, and can tell where they will be months and even years from now. Therefore we know what planets will be seen, when eclipses will occur, what other phenomena will happen.

Mercury, for example, which many people have never seen at all, will be in its best evening position about May 18, when it is farthest east of the sun, remaining low in the western sky after sunset.

By the end of February Venus will appear as a morning star, seen in the east before sunrise. It will gradually dim from its early splendor, drawing again into line with the sun, and vanishing for a time, on November 16. By the end of 1942 it will again be in the evening sky, slowly brightening for another brilliant appearance in the spring of 1943.

Mars will continue getting fainter, and will be completely out of sight by October 6, when it will be in line with the sun.

Jupiter will continue shining in the evening sky until a few weeks before June 25, when it comes into the same direction as the sun. After that, it will be a morning star, coming back into the evening sky at the end of the year.

Saturn Makes Exit

Saturn will exit from the evening celestial stage early in May. It will be in line with the sun May 23, and will show as a morning star during the summer. By December 1, it will be visible all through the night, and will be seen easily in the evening once more.

As if to make up for the poor planet display, 1942 will bring five eclipses, two of which, both total, of the moon, will be seen from the United States and Canada. The other three, of the sun, are all partial, and will have no scientific interest. Two, on March 16 and on August 12, will be seen in the Antarctic regions, and the third, on September 10, in the Arctic.

The first total eclipse of the moon occurs on the night of March 2. It begins before moonrise in the United States, but the ending will be seen all through North America, except the extreme northwestern part.

The second eclipse of the moon, also total, will happen on August 26. This time the beginning will be visible in all North America except the western and northwestern part. The end will be seen in all except the northwestern part.

Three more occultations of Aldebaran, like the one this month on the 27th, are on the program. The one on March 22 is in the evening, that of September 2 in the afternoon and of October 27 late at night.

As the new year opens, our planet display of recent months comes toward its end. At the beginning of January, it is still possible to see four of the five naked eye planets in the sky simultaneously, but one, Venus, is gone by the end.

Venus Still Brightest

Venus is still the most brilliant of the stars or planets. It shines low in the southwest just after sunset. However, the sun is rapidly catching up to it, and will pass the planet on February 2. For several weeks before this date, Venus will be so nearly in line with the sun, and will set so early, that it will be gone from view.

Mars, high in the southwest, appears in the accompanying maps, which reveal the way the heavens appear at 10:00 p.m. January 1; 9:00 p.m. on the 15th and 8:00 p.m. on the 31st. Mars is drawing away from earth after its close approach of last October, and is rapidly getting fainter, though it is still brighter than most first magnitude stars. It is now in the constellation of Aries, the ram, though just on the edge of his neighbor, Pisces, the fishes. Above, and a little distance to the left, near the cluster of faint stars called the Pleiades, is Saturn, now standing in Taurus, the bull. Its brightness is about the same as that of Mars.

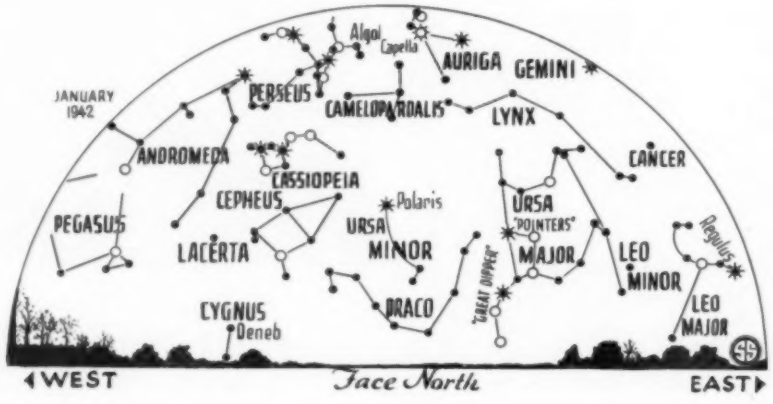
The brightest planet that is seen throughout the month is Jupiter, also in Taurus, near the V-shaped star group called the Hyades, outlining the bull's face.

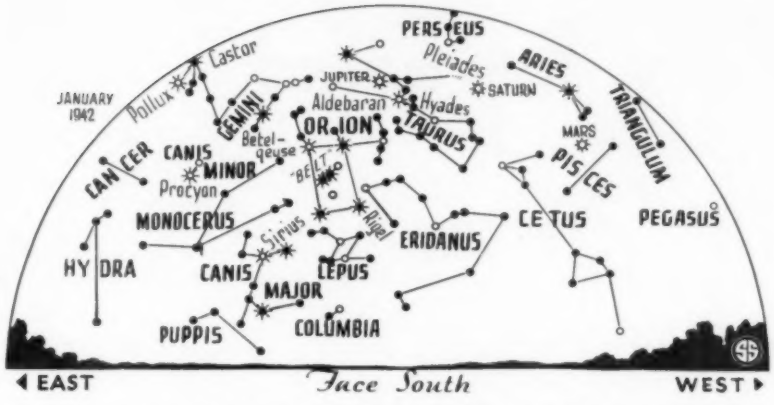
Brief Visit of Mercury

Mercury will make a brief appearance about the 25th, when it is farthest east of the sun. For a few evenings around that date it will set about an hour after the sun, but it will be rather difficult to see.

The moon, in a gibbous phase just after first quarter, will pass through this part of the sky January 25-27. At 3:22 a.m., E.S.T., on January 24, the moon passes Mars. The next afternoon, at 12:23 p.m., E.S.T., it goes past Saturn. Then, on the 27th, at 4:44 a.m., E.S.T., it passes Jupiter. And just for good measure, earlier that same morning, about 2:00 a.m., E.S.T., the moon will go in front of the star Aldebaran, which indicates the bull's eye. For nearly an hour the star which is of the first magnitude, will be eclipsed, or "occulted."

The usual brilliant stars of January have some competition at this time from the planets, but they are well worth seeing. Most brilliant of all is Sirius, the dog-star, in Canis Major, the big dog, to





the southeast. Between Sirius and Aldebaran are the three stars of Orion's belt. Above the belt is Betelgeuse, below is Rigel. Procyon, in Canis Minor, the little dog, is above and to the left of Sirius, while still higher is Pollux, in Gemini, the twins. Almost directly overhead is Capella, in Auriga, the charioteer. All of these stars mentioned by name are of the first magnitude. So also is Deneb, in Cygnus, the swan, low in the northwest, and Regulus, in Leo, the lion, to the west.

Celestial Time Table for January, 1942

Friday, Jan. 2, 10:42 a.m., Full moon; 2:00 p. m., Earth nearest sun—distance 91,314,000 miles. Saturday, Jan. 10, 1:05 a. m., Moon in last quarter. Wednesday, Jan. 14, 5:00 p. m., Moon nearest—distance 225,670 miles. Friday, Jan. 16, 4:32 p. m., New moon. Sunday, Jan. 18, 8:06 a. m., Moon passes Venus. Saturday, Jan. 24, 1:35 a. m., Moon in first quarter; 3:22 a. m., Moon passes Mars. Sunday, Jan. 25, 7:00 a. m., Mercury farthest east of sun, sets about an hour after sunset, but difficult to see; 12:23 p. m., Moon passes Saturn. Monday, Jan. 26, Noon, Moon farthest —distance 246,790 miles. Tuesday, Jan. 27, about 2:00 a. m., Moon occults Aldebaran; 4:44 a. m., Moon passes Jupiter.

Eastern standard time throughout.

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PHYSIOLOGY

Enzyme in Body Prevents Squandering of Food Store

AN ECONOMIZER enzyme of the body which, like a thrifty housewife, helps to prevent squandering of foodstuff reserves, is giving scientists clues to some unsolved cancer riddles, it appears from the report of Dr. Kurt G. Stern, of Yale University School of Medicine, to the American Chemical Society.

The economizer enzyme has been christened the Pasteur enzyme by Dr. Stern and his associates, Dr. Joseph L. Melnick and Delafield DuBois, in honor of Louis Pasteur, French bacteriologist and chemist who discovered the power of oxygen to throttle fermentation processes and thus protect food stores of the body from needless destruction. It is the Pasteur enzyme which keeps the oxygen at this thrifty task. Otherwise food combustion in the body would be so uneconomical that each adult would have to consume daily more than 10 loaves of bread.

Shortage of the thrifty Pasteur enzyme, Dr. Stern believes, is responsible for the fact that all cancer cells form lactic acid in air from foodstuffs instead of following the more efficient food combustion process of normal cells.

How the shortage of the Pasteur enzyme comes about in the cancer cells is not known, "but," Dr. Stern said, "we do know that the Pasteur effect is impaired if cells suffer chemical or mechanical damage and that tumors frequently arise in the wake of serious injuries sustained by normal tissues."

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AERONAUTICS—MEDICINE

Mayo Doctor Urges Pilots To Take up Hobbies

Men Trying To Adapt to Super-Powered Machines and Extreme Altitudes Must Learn To Rest and Relax

TODAY'S high and fast flying pilots will take up stamp collecting, gadget making or the study of foreign languages if they listen to the advice of Mayo Clinic nerve specialist, Dr. M. N. Walsh.

The modern pilot's nerve-splitting profession not only requires that he groom his body like Joe Louis, but that he save every possible milligram of his nervous energy by learning how to relax, Dr. Walsh declares.

Although men still have horse-and-buggy bodies, they are trying to adapt themselves to super-powered machines piercing the new and startling environment of the icy upper air. Science is inventing devices to help—the oxygen mask—but, as one veteran pilot told Dr. Walsh, "man is so far behind the airplane in efficiency that it will be difficult to catch up."

Dr. Walsh points out "that altitudes to which certain of the high-powered airplanes of today will take their pilots exceed by 300 to 400% the peak . . . altitude (which human beings can endure) without additional supply of oxygen. The rate of climb is so fast that human beings may not be able to accommodate themselves . . . (without the formation of) air bubbles in the tissues."

"In addition, the factors of intense cold, bulky and uncomfortable clothing, and the necessity of combating the well-known decrease in mental efficiency and the feeling of malaise common at high altitudes, all tend to produce a state of exhaustion in the pilot and crew which may become chronic if work at high altitudes is often necessary."

To combat excess drain on nervous energy, Dr. Walsh urges perfect physical condition aided by frequent rest periods and hobbies.

"The importance of hobbies in securing mental relaxation is much underestimated," he says. "The chief value of hobbies . . . lies in their capacity to release pent-up nervous tension."

"The most satisfactory hobbies are those which involve making something with the hands or forming collections, so that the individual can enjoy the feeling that he has created something worth having, and can spend a quiet and restful hour with his hobby in forgetfulness of the worries of his daily occupation."

Dr. Walsh suggests carpentry, shop work, model making, the formation of scrapbooks, and the study of foreign languages.

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MEDICINE

'Flu Virus Revealed

Stripped From Larger, Camouflaging Cell, 'Flu Germ Measured and Analyzed, May Soon Be Conquered

By JANE STAFFORD

IF THE widely expected influenza epidemic of the present war holds off a little longer, scientists may actually be ready for it.

They have at last put the finger on the 'flu germ itself. With the aid of a giant centrifuge, the germ has been separated from a larger cell which for long had camouflaged it.

This camouflage was so successful that until recently its existence was not even suspected. Because of it, scientists trying to protect people from influenza by vaccination were making their vaccine from material containing only about one-tenth as much influenza virus as they thought they were using.

The camouflaging cells are probably normal components of the mouse lung tissue on which the 'flu germs were grown in the laboratory. They were themselves extremely small—too small to be seen with powerful microscopes ordinarily used, and small enough to pass through the pores of fine-grained porcelain filters. But the 'flu germ, or the particles that make up the influenza virus, are still smaller.

Their size could not be estimated until recently. Now, with the aid of the electron microscope, scientists are able to see what they look like and measure them. They are among the smallest of disease-causing agents. Placed side by side enough of these spherical particles to give influenza to about 500 mice would stretch across the period at the end of this sentence.

How It Was Done

Stripping the unsuspected camouflage from the influenza virus particles was done by growing the virus on developing hen's eggs instead of on a preparation of mouse lung tissue. The extra-embryonic fluids from the infected eggs were put into a centrifuge like a cream separator, only much more powerful. This centrifuge subjected the fluids to a pull of 90,000 times that of gravity. After a few hours of this, the influenza virus particles were all pulled out of the fluid and forced to settle to the bottom in a sediment.

From this material, scientists have made a new vaccine. They hope it will be powerful enough to protect you from influenza the way you can now be protected from smallpox by vaccination.

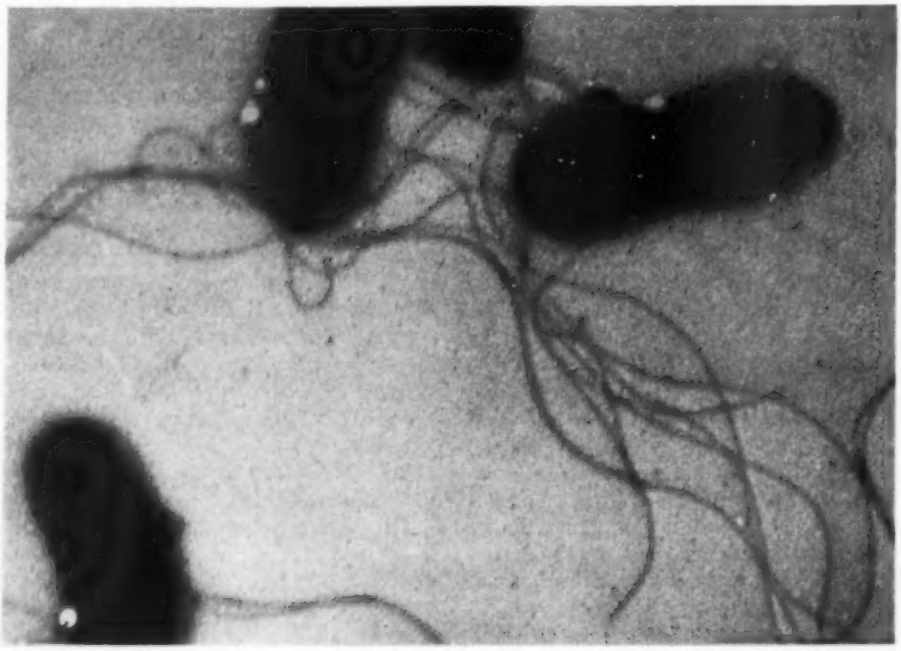
This new influenza vaccination is now being tried on several hundred volunteers. It will be some time before its ability, if any, to confer resistance to influenza is known.

Vaccination against influenza was hopefully tried during last winter's epidemic, using the virus which scientists previously believed was the true influenza virus. Among several thousand people so vaccinated, influenza was 50 per cent less than among the unvaccinated population of the same institutions. The best this or any then conceivable vaccination could do, it seemed, was to raise the 'flu-fighting antibodies in the blood of susceptible persons to the normal level. The level of these antibodies in your blood is related to the degree of resistance you have to the disease, but even a person with a high antibody level sometimes gets influenza.

The newest material for influenza vaccination will, it is hoped, step up your resistance to the disease above the present normal. First inkling of what it can do will come when the vaccinated volunteers have their antibody level read.

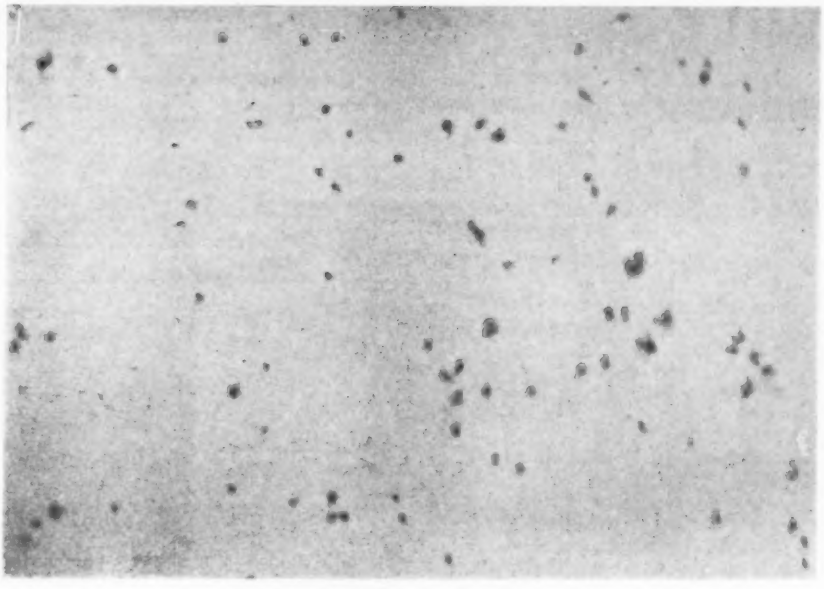
Scientists, however, now have more than one string to their bow for fighting influenza. The same scientists at the University of Pennsylvania, Dr. Leslie A. Chambers and Dr. Werner Henle, who have shown the world with the electron microscope what the 'flu germ really is, have also started analyzing it to find what it is made of. So far, they find it consists largely, if not entirely, of nucleoprotein. This is a general name for a class of chemicals found in the nucleus of cells.

They are complex substances, combinations of nucleic acid with simple proteins. Chemists have been trying to produce a drug that will cure influenza as the sulfa drugs cure certain other germ diseases. So far they have been unsuccessful, but they may now have a better chance. They may, for example, be able to find a chemical which will split off the part



BY CONTRAST

The typhoid fever germ, shown here enlarged only 25,000 times, appears enormous compared with the much greater magnification of the influenza germ on page 409.



SMALL BUT MIGHTY

Here, at last, is the influenza germ itself. But this agent of suffering and death is far smaller than the tiny particles barely visible in this picture. They are shown here magnified 65,000 times their actual size.

of the influenza nucleoprotein that makes you sick. Or they may find a chemical that will change the way the 'flu nucleoprotein is put together so that it loses its ability to cause sickness. Such a chemical could perhaps be used like a drug to treat influenza patients and speed them to recovery.

Human noses may provide still another line of attack on influenza. The nose is equipped with a mechanism for defense against foreign invaders, whether they be disease-causing germs or bits of dust. Besides this general defense mechanism, the human nose seems to have a special anti-influenza defense. Secretions from the nose can inactivate the influenza virus, Dr. Thomas Francis, Jr., of New York University College of Medicine, discovered about a year ago. This ability develops or is sharply increased after an attack of influenza, he finds.

Ability of nasal secretions to stop the influenza virus is due, Dr. Francis thinks, to the presence of anti-influenza antibodies like those found in the blood. Further study along this line may add to the knowledge scientists need for conquering influenza.

If influenza strikes before scientists are ready with vaccination to protect against it or a chemical to treat it, human blood might to some extent stem the tide of the epidemic. Suggestion of this possibility appears in the *Lancet,* an English medical journal.

Scientists are attempting to develop the vaccination that gives what is known as active immunization. This means it stimulates the body to produce influenza-fighting antibodies in great numbers whenever it is invaded by the influenza germ. Another way to protect people against germ disease is to give them the antibodies that have been produced in another person's blood by an attack of the disease.

This passive type of immunization against influenza works in animals, Dr. R. M. Taylor, of the Rockefeller Foundation, has found. He was able to protect mice against influenza by dropping into their noses the blood serum of ferrets that had recovered from and were immune to influenza.

The protection thus given does not last long, and there might be some danger in this method. But, the editor of the *Lancet* points out, blood from convalescent influenza patients would be available quite early in an epidemic and methods for testing its potency are known.

Might Sniff Protection

"Even temporary protection of key persons would often be quite worth while," the editorial states. "For instance, as often happens, if father and the children are all down with the 'flu and mother is looking after them, much would be gained if she could be protected during the difficult period by sniffing antibody once or twice a day. . . .

"We may one day be faced with a devastating scourge such as that of 1918-19, with little hope that laboratory studies can provide a remedy in time. Prophylactic application of convalescent serum to the nasal passages might then prove a godsend, capable of being put into effect even by those quite isolated from centrally organized help."

One reason why the *Lancet* editor thinks the laboratory scientists, in spite of their progress in the last 23 years, might not be ready in time for another world-wide 'flu epidemic is that their vaccinations, even if successful, are so far being directed toward only one type of influenza. Just as there are 32 distinct types of pneumonia germs, so there are at least three and maybe more types of influenza viruses. Type A and Type B have been separated from each other and from the unknowns. Type A has caused most of the trouble in recent years, and is the one from which present vaccines are made. If scientists can vaccinate successfully against Type A, they can probably do it against the other types, but it will take time, especially since not all of the others have been isolated and identified.

Unknown in 1918

Scientists have come a long way in their fight against the 'flu germ since this invisible agent of death swept around the world toward the close of the first World War. No one then knew really what the 'flu germ was. A tiny rod-shaped germ found in nose and throat washings and blood from influenza patients was suspected of being the actual culprit and even got a name, Haemophilus influenzae. That turned out to be a false lead.

First real break in the long, discouraging fight came when Dr. C. H. Andrewes, Dr. P. P. Laidlaw and Dr. Wilson Smith in England trapped what seemed to be the influenza germ itself, a virus so small they could not see it under their microscopes but could use it to produce influenza in ferrets.

This, in turn, led to the accidental discovery, by Dr. F. H. Horsfall, Jr., and Dr. E. H. Lennette, of the Rockefeller Foundation, that ferrets which had recovered from attacks of the dog disease, distemper, were immune to influenza. From this came the development of the influenza and distemper viruses into material for vaccinating people against influenza, with some, but not all the success hoped for.

Discovery of the sulfa drugs was another break in the fight against influenza, because, while these drugs are ineffective in cases of 'flu, they can cure the pneumonia that so often followed influenza and delivered the death blow to the victim.

MEDICINE

Sulfathiazole Means of Mass Attack on Gonorrhea

SULFATHIAZOLE, one of the sulfa drugs, appears to be the means of an effective, broad-scale attack on gonorrhea, according to a study by Drs. J. F. Mahony, C. J. Van Slyke and R. R. Wolcott of the U. S Public Health Service.

The Public Health Service physicians report on results of sulfathiazole treatment of 360 patients at U. S. Marine Hospital, Staten Island, N. Y. The gross rate of cure for the 360 patients was 85.4%. None of the patients was severely poisoned by the drug, and even mild symptoms were infrequent.

Science News Letter, December 27, 1941

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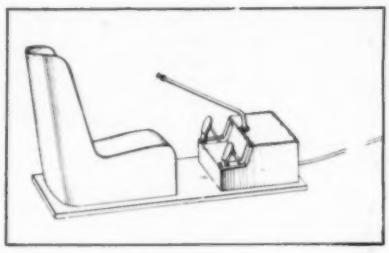
New Machines And Gadgets

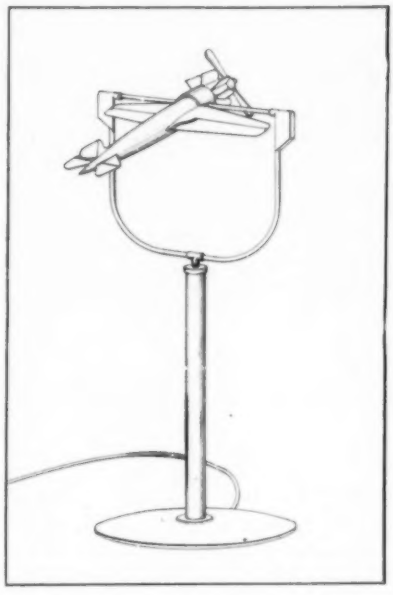
Novel Things for Better Living

The amateur painter has a problem —how to keep his brushes during the long intervals between one little job and the next. For the professional who uses his brushes every day, the problem is not so acute. However, the problem has been solved by a handy flat can with a removable cover that has a hole in it that allows the brush handle to protrude. So far nothing unusual! But now comes the little trick that makes it something. A rubber collar pushed down the handle seals the opening in the cover, presents evaporation of the solvent and allows the brush to hang freely—a very important point in preserving a paint brush.

Permanent magnets are now made more strong and more lasting by a new process and a new material. The process consists in heating the magnet material and then allowing it to cool slowly in field of a powerful magnet. The material is composed of iron, nickel, aluminum and cobalt, with sometimes a small amount of copper. With these more powerful magnets, reductions in the size and weight of apparatus can be made.

This seat represents the pilot's place in an airplane. The learning aviator sits in it and manipulates the "stick" and the pedals before him and these, by means of electric impulses transmitted through a cable, actuate the control surfaces of the model airplane shown in the lower cut. This model plane is so supported that it is free to turn in any direction. Wind from a fan blows against it so that it tilts or turns or noses up or down in response to the movements of the student aviator just as a real airplane would do under like circumstances. A patent has been awarded for this invention.





The photoelectric eye is accomplishing remarkable things these days. Perhaps one of the most remarkable is an arrangement in which an electric eye looks at a drawing or pattern, so to speak, and causes a pointer to follow the outline, just as a human being might do with aid of his own eyes and hand. A second pointer, actuated by the first through a pantograph, traces the same diagram or a larger or a smaller replica on another sheet. Or the second pointer may be replaced by a small blow torch which cuts the pattern out of some material.

A non-misplaceable blotter is an invention newly patented. You just can't misplace or lose it under a pile of papers, because it's right on top of your fountain pen. It is a little roll of absorbent material on top of the pen, and it fits inside the cap, so it cannot ink your pocket. When used up, it can be quickly replaced by a fresh roll.

Men, how would you like to light up your face just where you are about to

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shave it? This can be done with a dry shaver which has a little flashlamp incorporated in the case, a newly patented invention. It shines just where you are about to "mow 'em down." It is so deeply set in that it cannot shine in your eyes.

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, *1719 N St., N. W., Washington, D. C., and ask for Gadget Bulletin 84.*

Science News Letter, December 27, 1941

SCIENCE CLUBS OF AMERICA

Sponsored by Science Service

NEWS OF CLUBS

NEW CUMBERLAND, Pa.—A model of an atom smasher will be completed this year by members of the Science Club of New Cumberland High School. This active group operates the school's public address system and visual education program. Plans are now being laid for operating a weather bureau for the school. Some of the members are building radio transmitting and receiving sets while others are developing and printing their own pictures. Two of the members are carrying on experiments in color photography. The club is sponsored by John R. Smeltz, chemistry and physics teacher.

BRENTWOOD, Mo.—An exhibit for display at the Missouri Academy of Science Meeting is being built by members of the Lavoisier Club of Brentwood High School. The other club activities include maintenance of an aquarium stocked with animal life, and experimental work in the fields of botany, electricity and anatomy. The club is sponsored by Irl A. Gladfelter, science instructor.

DUKE CENTER, Pa.—The Science Club of the Otto Junior-Senior High School intersperses its work on scientific projects with a discussion of current scientific news and problems. The members of this group already have studied some taxidermy, geology, birds and trees. They have made model airplanes and studied various inventions. A recent trip to a game preserve familiarized the members with small game in its natural habitat and with the state's hunting laws. The club is sponsored by Harold Fenner, science teacher.

BEDFORD, Ind.—A general all-around activity is carried on by the Phi Pi Chi Club formed at Bedford High School. The programs and meetings cover fields of chemistry, physics, electricity, radio and photography. Convocation programs for both senior and junior high schools are worked out by the club members under sponsorship of W. D. Prather, science teacher.

SPENCER, Ind.—Many groups lose sight of the value of collections and hobbies as a dramatic power, but this is not so with the Spencer Science Club of Spencer High School. This group holds some very interesting hobby shows and makes numberous field trips during which it gathers materials useful for exhibits. The club is sponsored by Carl Corbin, teacher.

PRICEDALE, Pa.—Mere photography (printing, enlarging and developing) is not quite sufficient to satisfy the members of the Bio-Science Club at Rostraver High School. The members also do a lot of work along the lines of tinting and toning both still and motion pictures. Of course, other science demonstrations and programs are included in the club's plans. The sponsor is E. R. McLaughlin, science teacher.

ROCHESTER, N. Y.—The Third Annual Science Fair in Rochester will be staged in the new library building. This arrangement has been made because the fair promises to be too big for the quarters used in the past. A feature of the Fair will be a showing of science books arranged by the librarian. Extensive plans are already being made by the planning committee organized last spring and this bids fair to be the finest affair of its kind ever staged in Rochester.

Throughout the country Science Centers have been established where members of science clubs can congregate and demonstrate their abilities. The Science Center at Rochester is under direction of Harry A. Carpenter, specialist in science of the Rochester Board of Education.

FRONT ROYAL, Va. — Activities of the Science Club calling itself the "T N T" established at Warren County High School, are an integral part of the chemistry course. Exhibits, demonstrations, and laboratory projects are carried on in the club and, coincidently, in the classrooms. Groups are given opportunity to specialize in certain interests such as photography. The club is sponsored by Miss Vada C. Miller, head of the science department.

SYRACUSE, N. Y.—The 45th Annual Meeting of the New York State Science Teachers Association will be held in Syracuse from December 29 to 30 inclusive. A prominent place on the program will be given to discussing and planning science fairs, congresses and other activities for New York State Science Centers affiliated with Science Clubs of America.

In New York state science centers have been established at Buffalo, Rochester, Syracuse, Middletown, Oneonta, Peru, and Schenectady. In New York City and vicinity The American Institute of the City of New York carries on extensive activities, including operation of a science laboratory.

More than 300 science clubs in New York State take an active part in the functions planned by these science centers. Representatives from each center will appear on the New York State Science Teachers Association program and will repeat the prize-winning projects which won for them honors in their centers last season.

WILMINGTON, Del.—A very active science club has been sponsored by G. Emmett Kauffman of the Henry C. Conrad High School. In an article especially prepared for the Delaware School Journal, Mr. Kauffman has much to say about the establishment of a science center in his state. Quite a number of his colleagues have already demonstrated an interest in such an organization while industrial concerns in Delaware have offered their support to such a venture.

PROVIDENCE, R. I.—A movie of one day in the junior class is one of the activities which is being planned by the Sedes Sapientiae of St. Xavier's Academy. The club is divided into smaller groups which work upon the chemistry of cosmetics, plastics, hydroponics, radio and programs for the club as a whole. Lectures by invited guests and visits to industrial plants, with discussions by the club members following the meetings, are some of the other activities. This group is sponsored by Sister Mary Constance, R.S.M., head of the science department.

LITITZ, Pa. — Experiments are performed regularly in the meetings of the Bio-Phy-Chem Club at Lititz Borough High School. Members of the club engage in free discussions on scientific subjects, hold a science fair and visit museums such as the Franklin Institute and manufacturing plants in the vicinity. The club is sponsored by Anna K. Miller, science teacher.

CALVERT, Texas — The members of the Science Club of Calvert High School are permitted to follow all sorts of nature activities. The activity which interests each member most is selected by that member and then the individual is expected to do a very thorough job. Club members have full use of the school laboratory. Group research also is carried on. This club is sponsored by Marshall Boyd, principal of the High School.

Clubs are invited to become affiliated with SCA for a nominal $2 for 20 members or less. You can become an associate of SCA for 25 cents. Address: Science Clubs of America, 1719 N St., N.W., Washington, D. C.

ERRATA, Vol. 40, Nos. 1-26, July-December, 1941

PAGE	TITLE BEGINS	CORRECTIONS
26	Synthetic Starch	First synthesis of starch by Dr. C. S. Hanes of Cambridge Univ.
43	Vitallium Plates	Sub head "and Par. 2, line 2, molybdenum *for* nickel
53	Mystery Explosive Plant	Col. 3, line 3, TNT *for* Toluene
58	Celestial Time Table	Line 4, Mars *for* Venus. Line 12, Venus *for* Saturn.
69	Cancer Growth Prevented	Par. 3, line 2, 80% *for* 20%; Line 3, four-fifths *for* one-fifth
76	Caption	Line 2, Nares *for* Nark
89	Van Gent Comet	Line 9, T. *for* Y.
174	Inkblot Test	Par. 9, line 3, S. *for* C.
185	Million-Year-Old Tobacco	Par. 1. Line 1, *insert* relative *after* plant; line 2, shrub *for* tree; par. 2, line 3, *insert* -like plant *after* tobacco; par. 3, line 5, plant *for* tobacco; last par., line 2, nicotiana *for* tree tobacco.
219	Air	Col. 3, par. 5, line 4, positively *for* negatively.
245	Caption	Line 1, W. *for* G.
248	Difficult, Rare Operation	Line 7, adenoma *for* andemona
251	Steel Famine	Par. 7, line 3, pounds *for* tons.
252	Star Two Million	Heading, line 1, *read* Two Million Million Miles Away; par. 2, line 4 *to read*, million million miles; line 29, billion *for* million.
300	Lead-tin Alloy	Par 4, *delete first three lines and substitute* The X-ray diffraction pattern showed
373	Drug Speeds Evolution	Line 3, sulfanilamide for sufanilamide.

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•First Glances at New Books

BIOGRAPHY—MEDICINE

WILLIAM HENRY WELCH AND THE HEROIC AGE OF AMERICAN MEDICINE—Simon Flexner and James Thomas Flexner—*Viking Press,* 539 p., $3.75. A biography of the late, great Johns Hopkins bacteriologist called "Popsy" by his students and half of Baltimore. From an etching of a reluctant New York medical student in the 1870's, the book deepens to become a full portrait in oils of Dr. William Henry Welch, dean of American medicine, and "among the first American prophets of scientific medicine." Dr. Welch is principally known for his discovery of the gas-producing bacteria named for him. But as first dean of Johns Hopkins School of Medicine he began the proof, no longer necessary, that American medical schools can equal and surpass those of Europe. The Flexners have written a biography of American medicine as well as of a man; and their story of Dr. Welch shows him not always the formidable scientist, but sometimes a gentle humorist who loved practical jokes and the 'chute-the-chutes' and hot dogs at Coney Island.

Science News Letter, December 27, 1941

AGRICULTURE

VEGETABLE GROWING (3d ed.)—James Edward Knott—*Lea & Febiger,* 356 p., illus., $3.25. Third edition of a successful text, highly useful in agricultural college classes.

Science News Letter, December 27, 1941

LANGUAGE

LANGUAGE IN ACTION—S. I. Hayakawa—*Harcourt, Brace,* 345 p., $2. We use words and are affected by them almost constantly, yet most of us never get around to taking stock of the tools and swords that words actually constitute. Prof. Hayakawa, who was born in Canada and now teaches English at the Illinois Institute of Technology, has a gift for stimulating others to think more analytically about meanings, "loaded" words, propaganda, and naive and primitive assumption. Citizens of a modern society, he says, need more than horse sense; "they need to be scientifically aware of the mechanisms of interpretation."

Science News Letter, December 27, 1941

MEDICINE—PSYCHOLOGY—HISTORY

A HISTORY OF MEDICAL PSYCHOLOGY—Gregory Zilboorg and George W. Henry—*Norton,* 606 p., $5. An unusually important book because it is the first complete history of medical psychology. It records the gradual and often painful steps by which mental illness was finally acknowledged to be the concern of medicine—and not the sole domain of quacks and mystics. Not the least dramatic phase of this progress was the establishment of mental hospitals whose purpose was to heal and not merely to confine. Pioneer in this effort was an American, Dorothea Lynde Dix. The story of her battle for decent mental hospitals does not end with her life, but is still a current one in many sections of this country.

Science News Letter, December 27, 1941

ENDOCRINOLOGY

FROM CRETIN TO GENIUS—Serge Voronoff—*Alliance Book Corp.,* 281 p., $2.75. An interesting, but overly sensational volume on popular endocrinology. Many of Dr. Voronoff's statements are strongly contested by more conservative scientists. The book should be read for entertainment rather than instruction.

Science News Letter, December 27, 1941

AERONAUTICS

AIRFRAMES, Part 3—E. Molloy and E. W. Knott, eds.—*Chemical Pub. Co.,* 132 p., illus., $2.50 Volume 14 of a series on "Aeroplane Maintenance and Operation". This volume contains directions for rigging, dismantling, assembling, maintenance and lubrication for the Bristol "Blenheim," Taylorcraft, Cunningham-Hall, and Douglas airplanes with a concluding chapter devoted to repair of metal hulls and floats.

Science News Letter, December 27, 1941

PHOTOGRAPHY

MODERN PHOTOGRAPHY, The Studio Annual of Camera Art, 1941-1942—C. G. Holme, ed.—*Studio,* 120 p., illus., paper $2.50; cloth, $3.50. A beautiful volume with photographs of peace and war; instants of tense crisis; passing horrors; and, in contrast, the eternal loveliness of sky and earth and sea and a baby's smiling eyes.

Science News Letter, December 27, 1941

AERONAUTICS

ENGINES—E. Molloy and E. W. Knott, eds.—*Chemical Pub. Co.,* Part I, 124 p.; Part II, 132 p.; Part III, 132 p., $2.50 ea. Volumes 5, 9, and 13 of a series on "Aeroplane Maintenance and Operation." These volumes are devoted to the maintenance and repair of several types of English airplane engines and two of American make—the Wright Cyclone and Continental.

Science News Letter, December 27, 1941

GEOGRAPHY

THAILAND, the New Siam—Virginia Thompson—*Macmillan,* 865 p., $5. Surmounting difficulties of gathering information from qualified observers and government sources, the author has produced a comprehensive study of the land of the white elephant. The book includes a history of Siam and its transition into a new democratic-minded state, and from there on modern Thailand's many-sided problems are set forth in factual detail.

Science News Letter, December 27, 1941

ETHNOLOGY—ANTHROPOLOGY

DEEP SOUTH, A Social Anthropological Study of Caste and Class—Allison Davis, Burleigh B. Gardner and Mary R. Gardner—*Univ. of Chicago Press,* 558 p., $4.50. To make this study of Negroes in a typical trade center of the cotton growing region, four anthropologists, a white man and his wife and a Negro and his wife, lived in the community for two years. They report the anxieties, frustrations, efforts at adjustment of the Negroes and the handicaps and needs of their situation.

Science News Letter, December 27, 1941

ECONOMICS

NATION AND FAMILY, The Swedish Experiment in Democratic Family and Population Policy—Alva Myrdal—*Harper,* 441 p., $4. Writing while totalitarian war disrupts Europe, the author looks ahead to post-war reconstruction and foresees: "A new interest will attach to productive investment in a nation's chief economic asset: children and their health and capabilities." Her book is written for English-speaking countries, telling what may be useful from Sweden's population studies and reforms in the past ten years.

Science News Letter, December 27, 1941

ANTHROPOLOGY

CULTURE ELEMENT DISTRIBUTIONS: XVII YUMAN-PIMAN—Philip Drucker—*Univ. of Calif. Press,* 139 p., $1.25. (Anthropological Records, Vol. 6, No. 3.)

Science News Letter, December 27, 1941

ETHNOLOGY

JUNGLE PEOPLE, A Kaingáng Tribe of the Highlands of Brazil—Jules Henry—*Augustin,* 215 p., $3.50. An anthropologist who lived for a year among these Indian farmer-hunters tells about their primitive living and thinking, particularly the old ways which they evolved before white men influenced their culture.

Science News Letter, December 27, 1941